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A Quantitative Study on the Association Between Stress Tolerance and Exercise Habits among Students Enrolled in a College of Health Professions Program

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Honors Research Project

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ABSTRACT

PURPOSE: The purpose of this study was to gain further knowledge on the effects of stress on students studying health professions by discovering common causes of stress, coping mechanisms utilized for stress of students, and how regular exercise relates to stress tolerance. **METHODS:** This study was a quantitative, cross-sectional design through a survey distributed via email to undergraduate and graduate students enrolled in a Midwestern university's College of Health Professions. Embedded in the email was an anonymous link to a survey, which was constructed through the Qualtrics survey platform. The survey included questions relating to stress about major life events occurred, daily hassles, coping mechanisms for stress, symptoms of stress, and current exercise habits. **RESULTS:** This study found that there was not a significant relationship between stress tolerance ratios and regular exercise ($p<0.05$, $p=0.31$). Similarly, no significant difference was determined when comparing academic levels and exercise habits ($p<0.05$, $p=0.316$). When examining the association between exercise as a coping mechanism and academic level, there was also not a significant relationship ($p<0.05$, $p=0.40$). **CONCLUSIONS:** Although the results of the study did not yield significant differences between variables, the results of the frequently reported life events, daily hassles, and coping mechanisms agreed with previous research. These findings implicate that undergraduate and graduate students have commonalities in major life events, daily hassles, and coping mechanisms for stress when compared to previous research. Trends were observed in this study, and should be examined further with a larger sample size.

INTRODUCTION

Undergraduate students and graduate students undergo a great deal of stress throughout their college career. These daily stressors in life can come from personal relationships, education, finances, work experiences, and career decisions. Stress can have a negative effect on overall health for those without effective coping techniques being done to aide in managing stress. The purpose of this study was to gain further knowledge on the effects of stress on College of Health Professions students by discovering common causes of stress, coping mechanisms utilized for stress of students, and how regular exercise relates to stress management.

Many studies have been previously conducted to analyze the effects of stress on college students. Although previous research has evaluated stress in comparison to different variables such as race, gender, and stress tolerance, few have compared the relationships across academic levels or academic disciplines. Previous research has studied incoming college freshmen to gain a representative sample of a campus by surveying students enrolled in a required, freshman level course. Stress may occur in many different settings throughout a college career, and the stress experienced as an incoming freshman may be perceived differently than a senior preparing to graduate and transition into an adult role. Limited research has been done on the effects of stress and types of stress that upperclassmen experience.

Additionally, limited research has been completed to study the effects of physical activity on stress levels. Regular exercise is an important factor in maintaining overall health physically, mentally, and emotionally. In addition to a limited comparison of stress and exercise, few studies have been conducted to observed exercise habits across academic levels, to conclude if exercise habits improve with age.

Previous studies have modified and utilized surveys to gain information on the many occurrences of stress on an individual and how that stress is handled. These studies have modified a Stress Tolerance Questionnaire, which encompasses four sections to evaluate stress (Welle & Graf, 2011). The first section of the Stress Tolerance Questionnaire includes quantification of life events intended to gain information on what major milestones a participant has encountered in the past. Daily hassles also contribute to the amount of stress occurred on a day to day basis which is also considered in this questionnaire. How participants handle stress was evaluated in the third section to identify coping mechanisms. Finally, to evaluate the effect of stress on an individual, stress symptomology was completed by each participant. Stress symptomology required the participant to respond to questions stating the specific symptom experience over a two week time period.

In addition to the Stress Tolerance Questionnaire, it is important to gain data on exercise habits by asking participants to evaluate their current amount of planned physical activity including the frequency, intensity, and amount of time allotted for exercise on a weekly basis. By including the components of the Stress Tolerance Questionnaire and a Planned Physical Activity Questionnaire (Karageorghis, C.I., Vencato, M.I., Chatzisarantis, N.L., Carron, A.V., 2005) comprehensive data collection was completed to properly analyze and observe significant differences between variables.

Results to this survey prove data helpful for discovering the most common causes of stress, and how different ages of students cope with stress, and how exercise relates to health professions student lives as they manage stress. This data was beneficial to the community, due to college students experiencing stress throughout their entire college career, not only limited to

their first year of college. This can be valuable information for stress management tactics, effective coping mechanisms, and promoting psychological and physical health through exercise. Data from this research can indicate different stressors at different stages in an undergraduate and graduate career to guide future research and education on bettering the physical and psychological health of college students.

This project consisted of a survey distributed via email to undergraduate and graduate students enrolled in a Midwestern university's College of Health Professions. Embedded in the email was an anonymous link to a survey, which was constructed through the survey platform called Qualtrics. The survey, titled Stress Tolerance Questionnaire, included questions relating to stress about major life events occurred, daily hassles, coping mechanisms for stress, symptoms of stress, and current exercise habits (Welle & Graf, 2011).

At an undergraduate and graduate level, College of Health Professions students can determine major suitable for their career goals. A variety of degrees are offered in nursing, social work, speech pathology and audiology, nutrition and dietetics, counseling, sport science and wellness education, and allied health. In training future healthcare professionals, rigorous foundational courses in health and wellness combined with practical experience in and out of the classroom prepares students for a career in the field of health professions upon graduation.

This study aimed to answer the following research questions:

Research Question 1: Are college students more likely to have higher stress tolerance if they engage in regular exercise?

Research Question 2: Does year in school influence stress tolerance in college students?

Research Question 3: Are upperclassmen college students more likely to participate in exercise as a coping mechanism compared to underclassmen college students?

LITERATURE REVIEW

The term "stress" was first defined by Hans Selye as "the non-specific response of the body to any demand for change" (Selye, 1956). Stress is subjective due to an individual's psychological state when undergoing stress and their ability to adjust to their environment (Bhujade, 2017). Perceived stress is the "feelings or thoughts that an individual has about how much stress they are under at a given point in time or over a given time period (Phillips, 2013)." As opposed to measuring the frequency of stress, perceived stress measures how the individual is reacting to the stressors in their lives. Personality, coping resources and support can all play a role in how they perceive stress and shows that an individual's environment affects their subjectivity to stress (Phillips, 2013). The Perceived Stress Scale is a 10-item scale that can be used to measure the perception of stress and develop the relationship between stress and various pathologies (Cohen, 1983).

Stress has been measured in many ways based on previous research. The Social Readjustment Rating Scale, developed by Holmes and Rahe (1967) is comprised of a list of 43 major life events, with scores associated with the severity of the life event. Items on this list are positive and negative major life events that can occur in a person's life that can cause stress, such as death of a spouse, divorce, marriage, pregnancy, or changing job positions. The score received can predict the participants' susceptibility to stress-induced mental health breakdowns (Miller & Rahe, 1997). Another cause of stress can be attributed to daily life hassles such as arguments, financial problems, and troubling thoughts about the future. These hassles can also be accompanied by "Uplifts" such as getting enough sleep, earning adequate money, and receiving good grades. Kanner (1981) developed a Hassles and Uplifts Scale which measures an individual's attitudes about these daily situations. Previous research has concluded that hassles

predict and contribute more to psychological symptoms when compared to life events (Kanner, 1981).

Undergraduate college students experience many stressors. Common causes for stress in a college student can include increased academic load, exposure to peer pressure, changes in family relationships, and adjusting to social life as a college individual (Kumar, S., Bhanagari, A, Mohile, A., & Limaye, A. 2016). The perception of college life can determine how a college student handles their stress. Stress can bring about a will to learn and feelings of competence if a student considers their education as a challenge. However, stress can also bring many symptoms including hopelessness and anxiety when a student sees their education as a threat (Bhujade, 2017).

Incoming freshmen undergo great amounts of stress as they transition to college life, which has led to extensive research on the first year of college regarding stress and coping mechanisms. However, the effects of stress can resonate throughout an undergraduate career, especially with graduating seniors. Seniors preparing to graduate are also experiencing major life changes and transitioning into new adult roles, however has little research on their experience of stress compared to the experiences of college freshmen (Lane, 2016).

Students pursuing degrees in the health professions field undergo the stress of all college students in addition to the added stressor of direct clinical experience as an undergraduate student (Chernomas, A., Condrey, D., Grubbs, L., Miller, S., & Tyre, B., 2012). Required courses for the health care degrees including nursing, exercise science, dietetics, speech pathology, and social work have been associated with high levels of stress according to previous research (Garber, 2017). Inability to cope with stress as a health professions student can affect

academics as well as performance in the clinical setting including clinical experiences, practicum experiences, and internships (McConville, J., McAleer, R., & Hahne, A., 2017). Effects of stress for the health care student population can have negative effects on their abilities as a health care provider and how they interact with their patients, clinical instructors, and supervisors. Some negative behaviors that can occur due to increased stress include impaired decision making, lower academic performance, and reduced empathy towards patients (Garber, 2017). The experiences of health professions students can be stressful, but each student's response to their specific situations with coping strategies, handling emotions, and resilience can determine the amount of stress they experience and how they tolerate stress (McConville et al., 2017).

How a student copes with stress within a college setting can be positive or negative and can have many effects on their overall health. Some health effects can include opportunities or risks for the individual depending on their coping mechanisms. Positive responses due to stress can lead to enhancing physical and mental health with participation in exercise and seeking social support from family members, mentors, or peers (Zaleski, E., Levey-Thors, C., & Schiaffino, K., 1998). Negative responses include behavior changes leading to unhealthy choices such as substance abuse and unsafe sex (Zaleski et al., 1998). Exposure to stress also makes a student more vulnerable to depression and other psychological issues (Kumar et al., 2016). This psychological stress can contribute to increased alcohol consumption, cigarette smoking, eating disorders, and weight changes in the college population (Economos, 2008). Short term effects of stress include symptoms like increased heart rate, increased blood pressure, panic attacks, and feelings of anxiety. Long term effects of stress can lead to hypertension, heart attacks, strokes, and memory loss (Kumar et al., 2016).

The variance in the ability to handle stress in college students can be attributed to stress tolerance (Welle & Graf, 2011). Stress tolerance is a phenomenon that looks at "how one effectively copes with the stress present in one's life. People with high stress tolerance can handle large amount of stress without suffering from its crippling effects" (Bland, 2014). Previous research has determined the effects of stress tolerance on college students and how physical activity plays a role in coping with stress as an undergraduate student (Bland, 2014).

Coping mechanisms like exercise and physical activity can provide health opportunities for college students as opposed to health risks (Zaleski et al., 1998). According to the American College of Sports Medicine (ACSM), the recommended amount of aerobic exercise is 30 minutes per day for 5 days a week at moderate intensity, or 20 minutes a day for 3 days a week at a vigorous intensity. This recommendation can be achieved in one session, or in bouts of at least 10 minutes. In addition to aerobic exercise, ACSM also recommends completing resistance training of each major muscle group 2-3 days per week with 48 hours of rest of muscle group(s) worked in between sessions (American College of Sports Medicine, 2000). For the general college population, physical activity has been established as an effective means of stress reduction and can support positive mental health (Ngyuyen-Michel, 2006). For health professions students specifically, studies have found that physical activity correlated with lower levels of self-reported perceived stress, when students utilize exercise and physical activity as a coping mechanism (Garber, 2017). This information suggests that education on physical activity and stress could benefit the college population as a whole and for students handling stress in the health professions field.

Stress tolerance and stress tolerance ratios was first established by Welle & Graf (2011) in a study which established the common causes of stress in college students relating to their

changing lifestyle and academic environmental stressors as an undergraduate student. This study also compared stress tolerance ratios of college students of differing gender and race to find trends in demographic groups in relation to stress tolerance.

Stress Tolerance Ratios were studied further by adding physical activity as a factor. The study by Bland (2014) evaluated common coping mechanisms in college students and compared high stress tolerance and low stress tolerance groups of students based on the type of exercise with which they engaged. Types of physical activity included moderate exercise, vigorous exercise, stretching, and resistance training. The study concluded that college students with high stress tolerance were more likely to engage in physical activity including leisure activities, planned exercise, extra-curricular activities and sports, and high stress tolerance was associated with vigorous exercise, stretching and resistance training.

There have been studies done previously to test different stress reduction interventions. A study by Baghurst & Kelley (2013) concluded that students who engaged in stress management and fitness as an intervention had significantly lower levels of perceived stress, test anxiety, and personal burnout. Those who engaged in regular physical activity specifically had significantly lower perceived stress and perceived stress. The current study aims to expand on previous research on stress tolerance, common coping mechanisms for stress, and exercise habits in college students.

METHODS

A quantitative, cross-sectional electronic survey design was used for this study. Survey questions were approved through the University's Institutional Review Board. Recruitement emails were sent to undergraduate and graduate students enrolled in a Midwestern university's College of Health Professions. Participants were also notifed that they would be able to exit the survey at any time. Embedded in the email was an anonymous link to the survey, which was constructed through the survey platform called Qualtrics. Recruitment emails were sent to students twice during the month of November, when the effects of stress on students are typically felt. Students were also recruited by contacting health professions university clubs and attaching the survey's anonymous link. Informed consent was indicated with the submission of the survey.

Participants were asked to complete a survey relating to stress and exercise comprised of four checklists called a Stress Tolerance Questionnaire, included in Appendix A. The first set of questions was a Life Events Checklist (32 items) where participants selected "yes" or "no" if a common major life event occurred within the past year (Bland, 2014). The second set of questions included a Daily Hassles Questionnaire (42 items) where the items on the checklist included minor daily occurrences. Participants were asked to select "yes" or "no" if the everyday stressors occurred to them in the past month (Bland, 2014). Thirdly, participants were asked to complete a stress symptomology inventory (41 items) developed by Shafer (1999) to determine the amount of stress symptoms occurring within the past two weeks. Choices included "did not occur," "occurred 1-2 times," "occurred several times," and "occurred more than 10 times." The answers to these questions gives a total stress symptomology score.

Lastly, participants were asked to answer the Brunel lifestyle physical activity questionnaire to obtain physical activity habits of the participants (Karageorghis et al, 2005). Demographic information was also collected and used in data analysis.

The surveys were stored on a password protected computer and was accessed only by the researcher and project sponsor. Data was deleted by Qualtrics following the final submission of the project after data collection and analysis were complete. The information gathered by the survey was used to determine each subject's stress tolerance. A Stress Tolerance Ratio (STR) was provided by dividing the total number of stressors by the stress symptomology score obtained in the survey which can be calculated with the following formula: STR= (Major Life Events + Daily Hassles)/Stress Symptomology score. This ratio quantifies the subject's tolerance to stress to be used in statistical analysis with a higher STR correlating with a higher tolerance to stress and a lower STR correlating with a lower tolerance to stress. Survey results were analyzed using Chi-square analysis and McNemar's analysis.

RESULTS

The purpose of this study was to observe the effects of stress tolerance on college students in the College of Health Professions and how exercise is utilized as a coping mechanism for stress. There were 98 respondents to the survey in total. **Figure 1** illustrates the characteristics of respondents by gender, with 93.88% (N=92) respondents identifying as female, while 6.12% (n=6) of respondents identifying as male. In Fall 2017, the total number of students enrolled in the College of Health Professions was 3,832 including undergraduate and graduate students. Females make up 74.5% (n= 2,853) of those students whereas males make up 25.5% (n=979).

Figure 1. Characteristics of Respondents by Gender

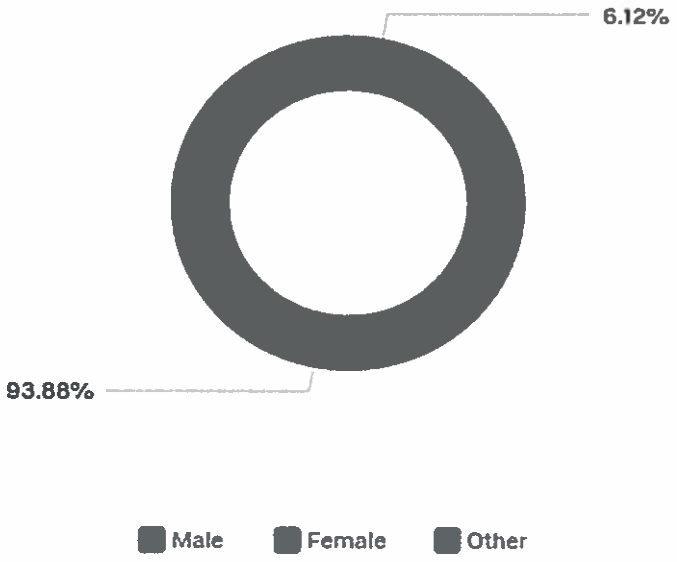
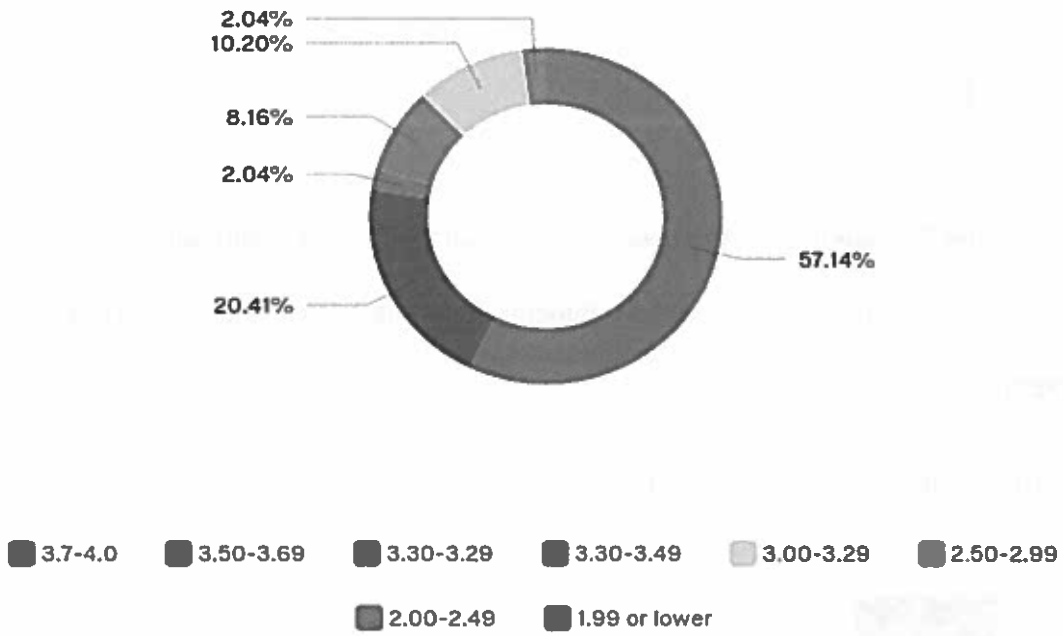


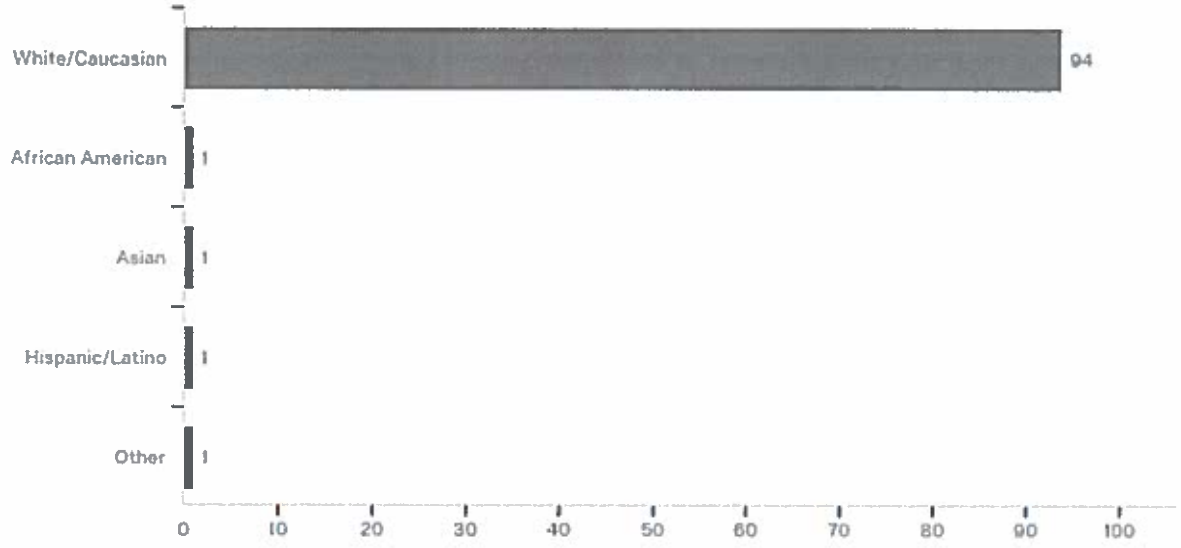
Figure 2 illustrates the Grade Point Average (GPA) of respondents. The majority (57.14%) of respondents had GPAs within the range of 3.7-4.0, followed by the range of 3.5-3.69 for 20.41%, 3.00-3.29 for 10.20%, 3.30-3.49 for 8.16%, 3.30-3.29 for 2.04%, and 2.5-2.99 for 2.04% of respondents.

Figure 2. Respondents by Grade Point Average (GPA)



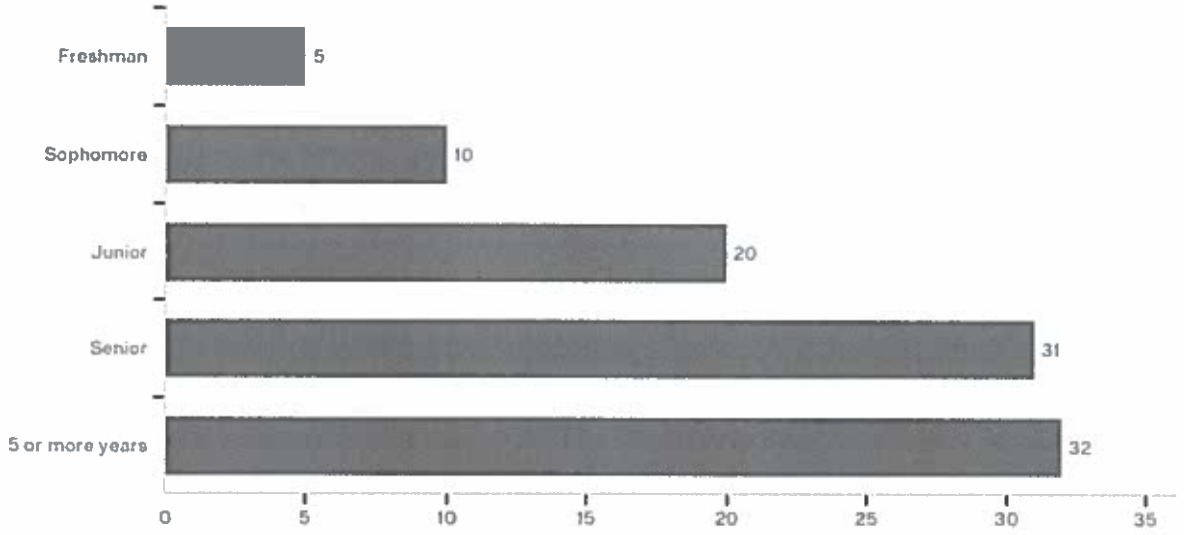
The vast majority, 95.9% (n=94), of respondents identified as White/Caucasian, while only 1 respondent identified as each of the other listed races as seen in **Figure 3**. Enrollment by race/ethnicity within the College of Health Professions is 76.4% White/Caucasian, 12.2% is African American, with less than 3% for Hispanic/Latino, Asian or Other.

Figure 3. Characteristics of Respondents by Race



Out of the 98 respondents, there were 5 freshmen (5.1%), 10 sophomores (10.2%), 20 juniors (20.4%), 31 seniors (31.6%), and 32 students attending for 5 or more years (32.7%) as seen in **Figure 4**.

Figure 4. Respondents by Year in School



Additionally, out of the 98 respondents, 72.4% (n=71) were undergraduate students, whereas 27.6% (n=27) were graduate students as seen in **Figure 5**.

Figure 5. Respondents by Type of Student

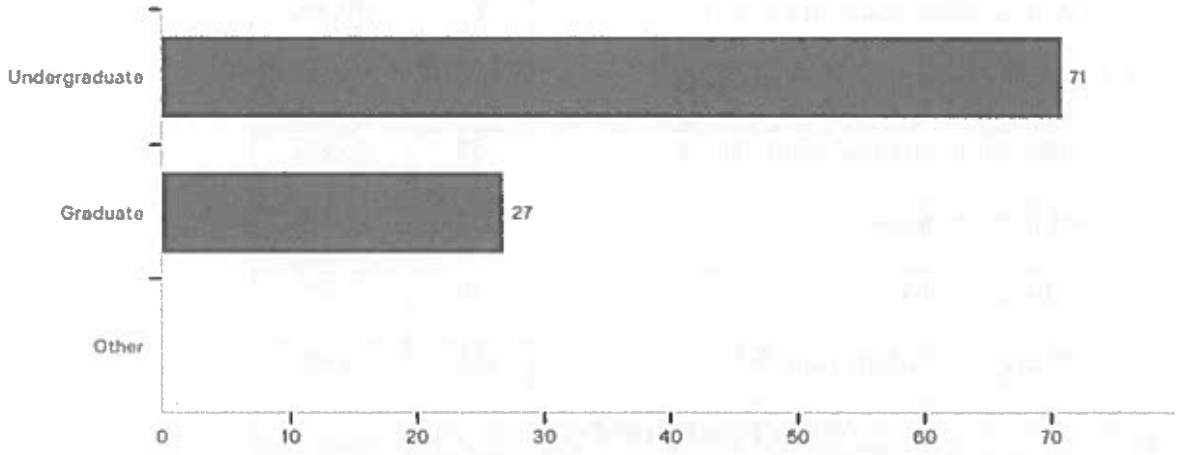


Table 1 shows the frequencies of life events, daily hassles, and coping mechanisms for stress ranked by percentage. The top 6-7 answers in each category are recorded. The vast majority (86%) identified working while in school as a source of stress. Feelings of uncertainty about the future (73%) was also a major source of stress. The most recorded daily hassles were all identified fairly equally among the top causes for daily stress. The responses for coping mechanisms were also fairly equally utilized, with the vast majority of participants (93%) reporting listening to music as the most common coping mechanism.

Table 1. Most Frequently Reported Life Events, Daily Hassles, and Coping Mechanisms, among college students

Life Events/Daily Hassles/Stressors	Freq.	Percent
Life Events (n=95)		
1. Working while attending school	82	86.3%
2. Feelings of uncertainty about future	69	72.6%
3. Outstanding personal achievement	53	55.8%
4. Summer job plans	50	52.6%
5. Losing a friendship	36	37.9%
6. Looking for a job in your field	35	36.8%
Daily Hassles (n=87)		
1. Assignments/Papers	78	89.7%
2. Tests	77	88.5%
3. Text Messaging	77	88.5%
4. Lack of sleep	73	83.9%
5. Procrastination	72	82.8%
6. Personal pressure to do well in school	71	81.6%
7. Deadlines	70	80.5%
Coping Mechanisms (n=86)		
1. Listen to music	80	93.0%
2. Participate in internet social network	77	89.5%
3. Took study break	74	86.0%
4. Quiet time	73	84.9%
5. Engaged in social interaction	73	84.9%
6. Cleaned apartment/living space	69	80.2%

To answer the first research question of whether college students were more likely to have higher stress tolerance if they engage in regular exercise, the amount of stress each participant of the study could tolerate was quantified by determining the Stress Tolerance Ratio (STR). Stress Tolerance Ratio was determined by taking the total number of stressors from their Life Events and Daily Hassles surveys and dividing by the total number of stress symptoms (Life Events + Daily Hassles/Stress Symptoms). Participants were categorized as having a High Stress Tolerance with a ratio of greater than 0.4, or having a Low Stress Tolerance with a ratio of less than 0.4. Out of the participants who completed the survey (n=86), 58.14% were considered having a Low Stress Tolerance (n=50) and 41.86% were considered having a High Stress Tolerance (n=36). A McNemar's test found there was no significant difference (p=0.31) between a student's stress tolerance and regular exercise, as shown in **Table 2.**

Table 2. Cross-Tabulation of Stress Tolerance Ratios and Regular Exercise Habits.

	Value	df	Significance (2-sided)
Pearson Chi-Square	340.974[a]	328	.299
Likelihood Ratio	244.442	328	1.000
Linear-by-Linear Association	7.515	1	.006
N of Valid Cases	86		

a. 415 cells (100.0%) have expected count less than 5. The minimum expected count is .06.

To answer the second research question regarding whether year in school influences stress tolerance in college students, a Pearson chi-square square of independence was performed. The test found there was no significant difference (p=0.316) between a student's year in school and Stress Tolerance Ratio (STR) score. These results can be seen in **Table 3**.

Table 3. Shows the total amounts of High Stress Tolerance and Low Stress Tolerance Participants based off Stress Tolerance Ratio (STR). Chi-square test results concluded p=0.316.

Occurrence of Regular Exercise	Low (STR less than 0.4)	High (STR greater than 0.4)	Total
Never= 0	14	5	19
1-2 times per week=1	14	7	21
3-4 times per week=2	12	12	24
5-6 times per week=3	6	8	14
7 or more times per week=4	4	4	8
Total	50	36	86
Test Statistic: 4.73			
p=0.316			
df=3			

Table 4 shows the results of the third and final research question: "Are upperclassmen college students more likely to participate in exercise as a coping mechanism compared to underclassmen college students?" Cross tabulation and chi-square test resulted in a non-significant relationship (p=0.40) between the year enrolled in school and whether or not participants engaged in exercise as a coping mechanism.

Table 4. Cross Tabulation of year in school and engagement in exercise as a coping mechanism. This question proved to have non-significant results ($p>0.05$). The chi-square test resulted in $p=0.40$.

		What is your year in school?					
		Freshman	**Sophomore**	**Junior**	**Senior**	**5 or more years**	**Total**
Engage in exercise i.e. Run/Jog/Walk/Lift/Sports/ Yoga	**yes**	2	4	9	22	18	55
	no	3	5	6	8	9	31
	Total	5	9	15	30	27	86
	Chi-square: 4.06 p-value=0.40						

DISCUSSION

The purpose of this study was to gain further knowledge on the effects of stress on College of Health Professions students by discovering common causes of stress, coping mechanisms utilized for stress of students, and how regular exercise relates to stress management. When determining answers to the research questions, there was a non-significant statistical relationship between stress tolerance ratio and regular exercise used as a coping mechanism for undergraduate and graduate students. Additionally, there was a statistically non-significant relationship between a student's year in school and Stress Tolerance Ratio (STR) score, where students were categorized as having a high or low tolerance to stress. Finally, there was a statistically non-significant relationship between Stress Tolerance Ratios (STR) and the amount of exercise completed per week. Although there were no significant relationships between these factors, valuable information and data was collected due to the distribution of this survey.

When looking at the data, trends can be seen that students who were calculated to have a low stress tolerance ratio had the most responses of exercising "Never" or "1-2 times per week." When comparing to the high stress tolerance ratio results, these students had the most responses in exercising "3-4 times per week", meeting the reported ACSM recommendations for amount of exercise on a weekly basis (American College of Sports Medicine, 2000). Additionally, when observing year in school and participating in exercise as a coping mechanism, a trend could be seen on how seniors and students attending for five or more years were more likely to report exercising to handle stress when compared to freshmen and sophomores. Trends can be found in the results of the survey, but significant differences were not concluded statistically. A lack of participation in freshmen and sophomore level students could be due to a lack of checking emails

and having less experience or knowledge in research. There was no incentive to participating in the study, so students could have felt it was less necessary to participate if there was no direct personal benefit. The increased participation in students who were in their third, fourth, and fifth years of college can be attributed to these students being more likely to have participated in research previously in their field. Like upper level undergrads, an increase in graduate responses can be explained by graduate students having experience in personally conducting research projects which can lead to a greater understanding of the importance of gaining enough participants for a study.

Based on survey responses, commonly occurring life events, daily hassles, and coping mechanisms were determined. The most common life events for participants in the study included working while attending school (85.3%, n=82), feelings of uncertainty about the future (72.6%, n= 69), and achieving outstanding personal achievements (55.8%, n=53). When observing these reports, working while attending school can be considered an external factor, where the individual has limited control over the situation, especially if a student is working in order to pay for college tuition. Feelings of uncertainty about the future and personal achievements can be considered internal factors, because they result in a personal reaction to these situations and there is more control on feelings towards these life events. Common daily hassles for participants included assignments and papers (89.7%, n=78), tests (85.5%, n=77), and the frequent occurrence of text messaging (85.5%, n=77). Observing these results show academic obligations to assignments, tests, and papers, whereas text messaging can be a personal hassle which can be reduced by limiting cell phone usage. Lastly, the most frequently reported coping mechanisms for the study included listening to music (93.0%, n=80), participating in internet social networks such as Facebook, Twitter, and Instagram (89.5%, n=77), and taking

study breaks (86%, n=74). For these coping mechanisms, the length of time to take a study break, listen to music, or participate in social media can result in the effectiveness of the coping mechanism. Too long of a time committed to these mechanisms can be considered a distraction by decreasing productivity during stressful times throughout a college career.

For the results of the frequently reported life events, daily hassles, and coping mechanisms, several of the most common occurrences agreed with previous research. In a previous study by Bland (2014), the most frequent life events agreed with the current study results with feelings of uncertainty about the future, summer job plans, and losing a friendship. Daily life hassles of tests, text messaging, procrastination, pressure to do well in school, and deadlines, also agree with the previous study. Finally, coping mechanisms like listening to music, participating in internet social networks, engaging in social interactions, were similar when comparing the most frequent reports in previous research to the current study. The most frequent occurrences of life events, daily hassles, and coping mechanisms data is useful information in identifying what stressors are occurring in college student lives and what methods are being used to cope with stress. Further research can be done based on this data to gain better perspective on the reasons why students choose to cope by utilizing certain mechanisms over others.

In terms of exercise, previous research also concluded that vigorous exercise, stretching, and resistance training were associated with high stress tolerance, while moderate intensity exercise did not yield a significant relationship with high stress tolerance (Bland, 2014). This can be due to the fact that vigorous intensity exercise is more likely to increase heart rate, blood pressure, and release endorphins.

Welle and Graf (2011) conducted a similar Stress Tolerance Questionnaire to determine Stress Tolerance Ratios. They concluded that based off of stress tolerance ratios, comparing males to females resulted in different ways of coping with stress. In addition to comparing gender, race also determined differing results of coping strategies when comparing whites to blacks. These results show that stress is handled differently depending on the individual. When comparing Welle and Graf findings with data in the current study, differing academic levels can reveal varying coping mechanisms to handle stress. This can show clinical significance in stress management programming and ensuring individualization of stress intervention programs for college students.

Limitations

There were several limitations to the study that could have contributed to the results. Although a great sample of surveys were taken, the variability across academic levels was not evenly represented. The lack of freshmen and sophomore responses could have led to non-significant results when statistically analyzing survey responses across grade levels. Additionally, graduate students were included in survey results to yield more data for analysis because of the need for more student responses, also effecting the results. A smaller sample size limits the statistical analysis of results, therefore, future research could either gain a more representative sample of all academic levels, or limit surveys to senior level students due to a lack of research completed on this specific population.

Because previous research suggests males and females handle stress differently (Welle & Graf, 2011) the overwhelming amount of female responses compared to males could have also affected the results which is considered another limitation to this study. Because the population

was limited to the College of Health Professions, the majors that are included in this college are nursing, social work, exercise science, dietetics, radiology, and allied health which are currently female dominated careers. Females represent 74.5% of the College of Health Professions whereas males represent 25.5%. This data reflected on the participants of the study which were 93.88% female and 6.12% male. The demographic representation in the College of Health Professions of males verses females could contribute to the increased number of female responses in this study. Future studies could aim to retrieve a more representative sample as far as gender by studying a more general population, or by studying a population of college students where there is more balance between gender demographics.

Another limitation to the study was the time allotted for data collection as well as the time the survey was distributed. This study was a cross-sectional design, allowing students to answer survey at that moment in time. Data was collected during week 12 and week 13 of the fall semester. Distributing the survey at a different point in the semester, such as during the last week of class and finals week, could have resulted in significant relationships due to increased stress at the end of the semester. Further studies could administer Stress Tolerance Questionnaires multiple times throughout a 15-week semester and follow patterns of stress for a longer amount of time. Additionally, to compare stress levels based on the time of year, survey results in the fall can be compared to results in the spring, corresponding with the same week of the semesters.

Finally, because the study included a self-reported survey, there could be error in the honesty of reports of individual participants. Participants could have also answered survey questions inaccurately by forgetting events that may have occurred within the time of the survey.

Further research could conduct an experimental design study to track exercise patterns of students and stress levels as opposed to collecting self-reported data.

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APPENDIX A SURVEY TOOL

The first section asks about demographic and education information. Please answer the questions as accurately as possible.

Q1 What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Other (3)

Q2 What is your current cumulative GPA?

- ○ 3.7-4.0 (1)
- ○ 3.50-3.69 (2)
- ○ 3.30-3.29 (3)
- ○ 3.30-3.49 (4)
- ○ 3.00-3.29 (5)
- ○ 2.50-2.99 (6)
- ○ 2.00-2.49 (7)
- ○ 1.99 or lower (8)
- ○

Q3 What racial/ethnic category do you identify with?

- ○ White/Caucasian (1)
- ○ African American (2)
- ○ Asian (3)
- ○ Hispanic/Latino (4)
- ○ Other (5)

Q4 What is your year in school?

- ○ Freshman (1)
- ○ Sophomore (2)
- ○ Junior (3)
- ○ Senior (4)
- ○ 5 or more years (5)

Q5 What type of student are you considered?

- ○ Undergraduate (1)
- ○ Graduate (2)
- ○ Other (3)

Q7 What college at The University of Akron are you enrolled in?

- ○ College of Health Professions (1)
- ○ Butchel College of Arts and Sciences (2)
- ○ College of Business Administration (3)
- ○ LeBron James Family Foundation College of Education (4)
- ○ College of Engineering (5)
- ○ College of Applied Science and Technology (6)

The next section asks about specific life events. Answer "Yes" or "No" by selecting the appropriate answer if the event has happened to you in the PAST 12 MONTHS.

Q12 Transfer to new university/ moving

- ○ yes (1)
- ○ no (2)

Q13 Beginning college

- ○ yes (1)
- ○ no (2)

Q14 Unexpected death of close family member or friend

- ○ yes (1)
- ○ no (2)

Q15 Death of close family member or friend with long term illness

- ○ yes (1)
- ○ no (2)

Q16 Pet dying or lost/ getting a new pet

- ○ yes (1)
- ○ no (2)

Q17 Serious personal illness or injury

- ○ yes (1)
- ○ no (2)

Q18 Pregnancy

- ○ yes (1)
- ○ no (2)

Q19 Serious injury or illness of family member

- ○ yes (1)
- ○ no (2)

Q20 Getting engaged

- ○ yes (1)
- ○ no (2)

Q21 Serious disagreements with parents

- ○ yes (1)
- ○ no (2)

Q22 Trouble with brother or sister

- ○ yes (1)
- ○ no (2)

Q23 Trouble with boyfriend/girlfriend

- ○ yes (1)
- ○ no (2)

Q24 Difficulty with roommate(s)

- ○ yes (1)
- ○ no (2)

Q25 Losing a friendship

- ○ yes (1)
- ○ no (2)

Q26 Unfulfilled desire to be in a dating relationship

- ○ yes (1)
- ○ no (2)

Q27 Feelings of uncertainty about the future/ future career

- ○ yes (1)
- ○ no (2)

Q28 Change in plans for a major/ career choice

- ○ yes (1)
- ○ no (2)

Q29 Currently failing a class

- ○ yes (1)
- ○ no (2)

Q30 Serious trouble with an instructor/professor

- ○ yes (1)
- ○ no (2)

Q31 Having to repeat a course

- ○ yes (1)
- ○ no (2)

Q32 Graduation

- ○ yes (1)
- ○ no (2)

Q33 Dropped more than one class

- ○ yes (1)
- ○ no (2)

Q34 Looking for a job in your field

- ○ yes (1)
- ○ no (2)

Q35 Summer job plans

- ○ yes (1)
- ○ no (2)

Q36 Working while attending school

- ○ yes (1)
- ○ no (2)

Q37 Outstanding personal achievement

- ○ yes (1)
- ○ no (2)

Q38 Change in living conditions

- ○ yes (1)
- ○ no (2)

Q39 Joining Greek Life

- ○ yes (1)
- ○ no (2)

Q40 Trouble with the law

- ○ yes (1)
- ○ no (2)

Q41 Big family event

- ○ yes (1)
- ○ no (2)

Q46 Other, please list below

_____

Q47 The next section asks about daily hassles. Answer "Yes" or "No" by selecting the appropriate answer if the event has happened to you in the PAST ONE (1) MONTH.

Q48 Parent/Family Issues

- ○ yes (1)
- ○ no (2)

Q49 Sexual problems

- ○ yes (1)
- ○ no (2)

Q50 Missing a family member (because of their absence)

- ○ yes (1)
- ○ no (2)

Q51 Text messaging

- ○ yes (1)
- ○ no (2)

Q52 Competitive sports

- ○ yes (1)
- ○ no (2)

Q53 Lack of finances for school i.e. books

- ○ yes (1)
- ○ no (2)

Q54 Lack of finances for living i.e. rent

- ○ yes (1)
- ○ no (2)

Q55 Lack of finances for going out

- ○ yes (1)
- ○ no (2)

Q57 Procrastination

- ○ yes (1)
- ○ no (2)

Q58 Lack of sleep

- ○ yes (1)
- ○ no (2)

Q59 Change in social habits

- ○ yes (1)
- ○ no (2)

Q60 Car problems/not having a car

- ○ yes (1)
- ○ no (2)

Q61 Early classes

- ○ yes (1)
- ○ no (2)

Q62 Issues with academic advising

- ○ yes (1)
- ○ no (2)

Q63 Increased workload at school

- ○ yes (1)
- ○ no (2)

Q64 Lower grades than expected/grades

- ○ yes (1)
- ○ no (2)

Q65 Too many missed classes

- ○ yes (1)
- ○ no (2)

Q66 Personal pressure to do well in school

- ○ yes (1)
- ○ no (2)

Q67 Worried about GPA

- ○ yes (1)
- ○ no (2)

Q68 Tests

- ○ yes (1)
- ○ no (2)

Q69 Parental expectations to do well in school

- ○ yes (1)
- ○ no (2)

Q70 Deadlines

- ○ yes (1)
- ○ no (2)

Q71 Scholarship

- ○ yes (1)
- ○ no (2)

Q72 Too much homework/ school overload

- ○ yes (1)
- ○ no (2)

Q73 Assignments/papers

- ○ yes (1)
- ○ no (2)

Q74 Worried about friends/boyfriends in the military

- ○ yes (1)
- ○ no (2)

Q75 Quality of food

- ○ yes (1)
- ○ no (2)

Q76 "Stupid" drivers

- ○ yes (1)
- ○ no (2)

Q77 Sick

- ○ yes (1)
- ○ no (2)

Q78 Argument with friends/ drama

- ○ yes (1)
- ○ no (2)

Q79 Gossip/rumors

- ○ yes (1)
- ○ no (2)

Q80 Living conditions

- ○ yes (1)
- ○ no (2)

Q81 Balancing social and school commitments

- ○ yes (1)
- ○ no (2)

Q56 Too much free time

- ○ yes (1)
- ○ no (2)

Q82 Time management

- ○ yes (1)
- ○ no (2)

Q83 Peer pressure

- ○ yes (1)
- ○ no (2)

Q84 Lack of time for leisure activities

- ○ yes (1)
- ○ no (2)

Q85 Body image/ keeping in shape

- ○ yes (1)
- ○ no (2)

Q86 Care giving for a child

- ○ yes (1)
- ○ no (2)

Q87 Responsibility for other adults

- ○ yes (1)
- ○ no (2)

Q88 Other, Please list below:

_____

The next section asks about specific symptoms of stress. In the past TWO WEEKS, how often did each of the following events occur?

Q90 Difficulty falling asleep

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q91 Dizzy

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q92 Feeling rushed

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q93 Moody

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q94 Sick

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q96 Tired/Exhaustion

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q95 Easily irritated

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q97 Feelings of anxiety

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q98 Feeling disorganized

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q99 Inability to concentrate

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q100 Sleeping more than usual

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q101 Fidgeting

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q102 Verbal attack on someone

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q103 Biting fingernail

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q104 Headache/Migraines

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q105 Antisocial/shut-down

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q106 Breakouts

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q107 Feelings of hopelessness

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q108 Panic

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q109 Nauseous

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q110 Feeling that things are "out of control"

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q111 Ate more/increased appetite

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q112 Ate less/loss of appetite

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q113 Disordered eating/eating disorders

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q114 Very tense

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q115 Strong urge to cry or crying

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q116 Thinning hair

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q117 Stomach pain

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q118 Neck tension

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q119 Back pain

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q120 Nervous

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q121 Want to scream

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q122 Worried

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q123 Restlessness

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q124 Hostility/tension

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q126 Can't think straight/can't focus

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q127 Frustrated

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q129 Feelings of being "overwhelmed by it all"

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q130 Depressed feelings/Depression

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

Q131 Short-tempered/temper/anger

- ○ Did not occur (1)
- ○ Occurred 1-2 times (2)
- ○ Occurred several times (3)
- ○ Occurred more than 10 times (4)

The next section asks about specific coping mechanisms. Answer "Yes" or "No" by selecting the appropriate answer to indicate which coping mechanisms you used to decrease or handle stress in the PAST TWO WEEKS.

Q134 Engaged in Leisure Activities i.e. walking, hiking, bowling

- ○ yes (1)
- ○ no (2)

Q133 Quiet time

- ○ yes (1)
- ○ no (2)

Q135 Engaged in social interaction

- ○ yes (1)
- ○ no (2)

Q136 Participated in an extra-curricular sport

- ○ yes (1)
- ○ no (2)

Q137 Participate in an extra-curricular activity that requires time or involvement on a weekly basis

- ○ yes (1)
- ○ no (2)

Q138 Listen to music

- ○ yes (1)
- ○ no (2)

Q139 Participated in internet social networks i.e. Facebook, Snapchat, Instagram, etc.

- ○ yes (1)
- ○ no (2)

Q140 Took study breaks

- ○ yes (1)
- ○ no (2)

Q141 Partied

- ○ yes (1)
- ○ no (2)

Q142 Used a substance, like alcohol, to deal with feelings or avoid problems

- ○ yes (1)
- ○ no (2)

Q143 Call a friend

- ○ yes (1)
- ○ no (2)

Q144 Called your mom or another trusted family member/mentor

- ○ yes (1)
- ○ no (2)

Q145 Played an instrument

- ○ yes (1)
- ○ no (2)

Q146 Mentally block stress out

- ○ yes (1)
- ○ no (2)

Q147 Eat to manage stress

- ○ yes (1)
- ○ no (2)

Q148 Engage in exercise i.e. Run/Jog/Walk/Lift/Sports/Yoga

- ○ yes (1)
- ○ no (2)

Q149 Prayed before stressful situation

- ○ yes (1)
- ○ no (2)

Q150 Increase involvement with spiritual outlets (such as church)

- ○ yes (1)
- ○ no (2)

Q151 Cleaned apartment/living space

- ○ yes (1)
- ○ no (2)

Q152 Increased sexual activity with monogamous partner

- ○ yes (1)
- ○ no (2)

Q153 Increased sexual activity with different partners

- ○ yes (1)
- ○ no (2)

Q154 Wrote in a journal

- ○ yes (1)
- ○ no (2)

Q155 Watched a movie

- ○ yes (1)
- ○ no (2)

Q156 Relaxed

- ○ yes (1)
- ○ no (2)

Q157 Sang

- ○ yes (1)
- ○ no (2)

Q158 Read a book

- ○ yes (1)
- ○ no (2)

Q159 Surfed the internet

- ○ yes (1)
- ○ no (2)

Q160 Went on trip/vacation

- ○ yes (1)
- ○ no (2)

Q161 Shopping

- ○ yes (1)
- ○ no (2)

The final section asks specific questions about physical activity behaviors. Please answer the questions as accurately as possible.

Note: Pre-planned lifestyle physical activity is any activity that is scheduled into your daily routine, which may enhance your health, fitness or well-being. Examples include brisk walking, yoga, cycling, intramural sports, ect.

Q165 How many times in a normal week do you engage in pre-planned activity?

- ○ 7 or more times (1)
- ○ 5-6 times (2)
- ○ 3-4 times (3)
- ○ 1-2 times (4)
- ○ Never (5)

Q166 How long have you been engaging in pre-planned physical activity at this weekly rate?

- ○ More than 7 months (1)
- ○ 4-6 months (2)
- ○ 1-3 months (3)
- ○ Less than 1 month (4)
- ○ Not relevant to me (5)

Q167 In general, what is the duration of each session of pre-planned physical activity that you engage in?

- ○ More than 30 minutes (1)
- ○ 21-30 minutes (2)
- ○ 10-20 minutes (3)
- ○ Less than 10 minutes (4)
- ○ Not relevant to me (5)

Q168 If you add together each session of pre-planned physical activity that you engage in during a normal week, how much time would you estimate that you spend in total?

- ○ More than 5 hours (1)
- ○ 3-5 hours (2)
- ○ 1-2 hours (3)
- ○ Less than 1 hour (4)
- ○ Not relevant to me (5)

Q169 In the past, how long have you generally persisted with a pre-planned physical activity program before giving up?

- ○ More than 6 months, or I have never given up (1)
- ○ Up to 6 months (2)
- ○ Up to 3 months (3)
- ○ Up to 1 month (4)
- ○ Not relevant to me as I have never persisted (5)

Q170 How vigorously do you engage in pre-planned physical activity? ("Very light" means that you hardly get out of breath. "Very hard" means that you exercise to the extent that you are breathing deeply.)

- ○ Very hard (1)
- ○ Hard (2)
- ○ Moderately hard (3)
- ○ Very light (4)
- ○ Not relevant to me (5)